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Ephemerides of Two Situations in the Leonid Stream. By G. Johnstone Stoney, M.A., D.Sc., F.R.S., and A. M. W. Downing, M.A., D.Sc., F.R.S.

The *ortho-Leonids*, the dense part of the great procession, will probably be streaming across the Earth's orbit next November. The Earth will reach the node probably not far from the epoch 1899 November 15^d 18^h (see *Proceedings of the Royal Society*, vol. 64, p. 409). At that time, were it not for moonlight, an endlong photograph of the part of the stream which is near the Earth but outside the atmosphere might perhaps be secured by pointing the telescope along the tangent of the meteoric orbit, which would require it to be pointed towards a situation in the heavens some degrees distant from the radiant point. But as the moon will be nearly full, it seems hopeless to obtain this photograph.

Under these circumstances, and as Dr. Isaac Roberts expressed his willingness to make another attempt to photograph the *Leonids* while outside the Earth's atmosphere, the best course appeared to be to provide an ephemeris which will enable observations to be made on groups of nights upon which the Moon will not interfere, and which come near the date on which the Earth reaches the node. This is done in the subjoined ephemerides. The Earth is so situated on those dates that an actually tangential view of the stream cannot be obtained, and accordingly we had to be content with computing the ephemeris for situations in the stream where it makes a small angle with the line of sight. Two such situations were selected, one to be observed in the group of nights free from moonlight which come next before November 15, and the other to be observed in the group of dark nights following that date. The first of the selected stations is the perihelion of the osculating ellipse of the part of the stream which the Earth encountered in 1866, and the other is the point along the same ellipse of which the mean anomaly is 30°. The osculating ellipse was obtained by allowing for the perturbations since 1866, as calculated in a paper on the perturbations of the *Leonids* read before the Royal Society last March, and published in the *R. S. Proceedings*, vol. 64, p. 403.

The ephemerides have been computed both for the above mentioned points and for points along the ellipse close to them, in order that it may be possible for the observer to foresee the position in his field of view of the tangent to the meteoric orbit. It may be expected that the meteors, if they can be photographed at all, will present themselves as a dim streak,

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like the faint part of a comet's tail, crossing the photographic plate in the direction so determined.

An inspection of the ephemerides shows that the direction in which the stream will cross the field of view in the observation to be made on the earlier group of nights is from the *nf* quadrant towards the *sp* quadrant, the position angle being about 50° on October 31, 40° on November 6, and 6° on November 12. In the observations to be made at the end of November and beginning of December, the apparent direction of the stream in the field of view will again be from the *nf* quadrant towards the *sp* quadrant, but the position angle will change but little during this fortnight. It will be between 53° and 55°.

Ephemeris I. records the apparent positions of the perihelion of the above mentioned osculating ellipse from midnight on 1899 October 31 till midnight on November 12.

Ephemeris II. records the apparent positions on the same dates of a point on the ellipse of which the mean anomaly is 0° 1′.

Ephemeris III. records the apparent positions as seen from the Earth at midnight from November 29 till December 11 of that point of the ellipse of which the mean anomaly is 30°.

Ephemeris IV. records the apparent positions on the same dates of a point on the ellipse of which the mean anomaly is 31°.

The computations have been made by Mr. Thomas Wright, of the staff of the *Nautical Almanac* Office, and the expense of the computation has been defrayed out of the Donation Fund of the Royal Society.

Greenwich, Midnight.	Right Ascension.		Declination.	
	I.	II.	I.	II.
1899.	h m s	h m s	° ′	° ′
October 31	9 41 23	9 43 7	N 18 5	N 18 26
November 1	9 44 10	9 45 54	18 4	18 27
2	9 47 2	9 48 45	18 5	18 28
3	9 50 0	9 51 41	18 6	18 30
4	9 53 5	9 54 43	18 9	18 34
5	9 56 20	9 57 55	18 13	18 39
6	9 59 45	10 1 17	18 19	18 46
7	10 3 23	10 4 51	18 27	18 56
8	10 7 18	10 8 40	18 38	19 9
9	10 11 36	10 12 49	18 52	19 25
10	10 16 23	10 17 23	19 12	19 46
11	10 21 47	10 22 29	19 37	20 12
12	10 27 56	10 28 13	N 20 7	N 20 45

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Greenwich, Midnight, 1899.		Right Ascension.						Declination.			
		III.			IV.			III.		IV.	
		h	m	s	h	m	s	°	'	°	'
November	29	14	15	48	14	17	15	S 7	12	S 7	27
	30	14	16	8	14	17	35	7	13	7	29
December	1	14	16	28	14	17	54	7	14	7	30
	2	14	16	48	14	18	13	7	16	7	31
	3	14	17	7	14	18	32	7	17	7	32
	4	14	17	26	14	18	51	7	18	7	34
	5	14	17	44	14	19	10	7	19	7	35
	6	14	18	3	14	19	28	7	21	7	36
	7	14	18	21	14	19	46	7	22	7	37
	8	14	18	39	14	20	4	7	23	7	38
	9	14	18	57	14	20	22	7	24	7	39
	10	14	19	15	14	20	40	7	25	7	40
	11	14	19	33	14	20	58	S 7	25	S 7	41

Observations of Comet a 1899 (Swift) made at the Royal Observatory, Greenwich.

(*Communicated by the Astronomer Royal.*)

The observations were made with the Sheepshanks Equatorial, aperture 6·7 inches, by taking transits over two cross-wires at right angles to each other, and each inclined 45° to the parallel of declination. Magnifying power, 55.

	Greenwich Mean Solar Time.	Observer.	☄—✶ R.A.	Corr. for Refraction.	Log. Factor of Parallax.	☄—✶ N.P.D.	Corr. for Refraction.	Log. Factor of Parallax.	No. of Comps.	Apparent R.A. of Comet.	Apparent N.P.D. of Comet.	Comp Star.
1899.	d h m s		m s	s		′ ″	″			h m s	° ′ ″	
May	6 15 16 25	W.	−0 5·03	−0·02	9·6152	− 9 29·7	−0·1	0·7653	6	23 49 21·69	62 32 12·5	*a*
	7 14 47 12	”	+0 40·42	−0·04	9 6220	−14 29·1	−0·4	0·7781	6	23 45 14·09	61 28 41·0	*b*

Notes.

These observations are corrected for refraction, but not for parallax. They are also corrected for the error of inclination of the wires and for the motion of the comet.

May 6.—Comet large and very bright, visible in twilight. Circular, about 5′ in diameter, with a central condensation.
May 7.—There was a well-defined nucleus.

The initial W. is that of Mr. Witchell.

Comparison Stars.

	Star's Name.	Assumed R.A. 1899·0.	Assumed N.P.D. 1899·0.	Authority.
		h m s	′ ″	
a	B.D. +27° No. 4640	23 49 25·65	62 41 43·6	Cambridge Astr. Gesell. Catalogue, 14341.
b	79 Pegasi	23 44 32·59	61 43 11·5	Greenwich Ten-Year Catalogue, 1890 (MSS.).

Royal Observatory, Greenwich :
1899 *June* 9.

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